REMARKS

Claims 1-9 and 12-17 are now pending in the application. Claims 10-11 and 18-27 have been cancelled. Applicants would like to thank the Examiner for the courtesies extended to the Applicants' representatives Bryant E. Wade and Jason A. Heist in the telephonic interview conducted on October 22, 2002. In the telephonic interview, the differences between the claimed invention and the prior art were discussed. The Examiner acknowledged that the rejection under 35 U.S.C. § 102 should be obviated in view of the claims as amended. In regards to the rejection under 35 U.S.C. § 103, however, no agreement was reached. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-17 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

Claim 1 is rejected because "it" lacks a clear antecedent. Claim 1 has been amended to replace "it" with terms that have a clear antecedent.

Claims 3, 5, and 6 are rejected because "around room temperature" is indefinite. Claims 3, 5, and 6 have been amended to delete "around".

Therefore, reconsideration and withdrawal of this rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by each of Fukuno et al (U.S. Pat. No. 5,665,177) or Hackman et al (USPN 4,930,565) or Honeycutt (USPN 4,945,974) or Bartlett et al (USPN 4,865,117). This rejection is respectfully traversed.

Claim 1 calls for a cooling roll for manufacturing a ribbon-shaped magnetic material by colliding a molten alloy to a circumferential surface of the cooling roll so as to cool and then solidify the molten alloy. Claim 1 has been amended to call for the gas expelling means to be defined by at least one groove provided in the circumferential surface of the cooling roll for expelling gas entered between the circumferential surface and a puddle of the molten alloy, wherein the average width of the groove is 0.5 – 90 μm for preventing the molten alloy from entering the groove.

None of the references cited anticipate an average width of a groove in the range of 0.5 – 90 μm. Fukuno et al, Hackman et al, Honeycutt, and Bartlett et al are all completely silent with respect to the widths of the grooves. At best, each reference teaches an average pitch. Each pitch disclosed by the references, however, is outside of the claimed groove width range. More specifically, Fukuno et al only discloses an average pitch in the range of 100 – 300 μm, Hackman et al only discloses an average pitch of 28-40 ridges per inch (i.e., 635-907 μm), Honeycutt only discloses an average pitch of 12-35 grooves per centimeter (i.e., 285.7- 833.3 μm), and Bartlett et al only discloses an average pitch of 8-35 grooves per centifmeter (i.e., 285.7-1250 μm).

As such, Applicant respectfully asserts that none of the references cited anticipate the claimed width in the range of 0.5 – 90 μm and, therefore, reconsideration and withdrawal of this rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 2-9 and 11-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukuno et al (U.S. Pat. No. 5,665,177). This rejection is respectfully traversed.

The Examiner alleges that Fukuno et al teaches a cooling roll for making rare-earth-iron-boron permanent alloys in the form of a ribbon wherein the cooling roll has grooves with a depth of 1-50 μm and a pitch of 100-300 μm. The Examiner also alleges that the grooves on Fukuno's cooling roll extend circumferentially, the cooling roll is comprised of a base and a surface layer which has a thickness of 10-100 μm, and a thermal conductivity less than the thermal conductivity of the base.

As stated above in the rebuttal of the rejection under 35 U.S.C. § 102, however, Fukuno et al is completely silent with respect to a cooling roll with gas expelling means defined by at least one groove provided in the circumferential surface of the cooling roll for expelling gas entered between the circumferential surface and a puddle of the molten alloy, wherein the average width of the groove is 0.5 – 90 μm. This width provides a cooling roll that expels gas entered between the circumferential surface and a puddle of the molten alloy. Critically, this width also prevents the molten alloy from entering into the groove. Expelling the gas enables reliable contact between the molten alloy and circumferential surface of the cooling roll. Such reliable contact provides uniform cooling of the molten alloy and prevents dimples from forming in the cooled alloy which may cause a magnet to be produced with insufficient magnetic properties.

In contrast, Fukuno et al in column 5, lines 56-67, teaches that the molten alloy should enter the grooves. "The grooves extend circumferentially in the circumferential surface thereof. The distance Di between two adjacent ones of the grooves at least in a region with which the molten alloy comes in contact is 100 to 300 μm on average in an arbitrary cross section

containing an axis of the chill roll (as shown in FIG. 1, the distance between two adjacent grooves is measured with respect to corresponding portions of the adjacent grooves). If the average distance Di is less than the range, the molten alloy enters the groove with difficulty so that the molten alloy might not be uniformly cooled, and the roll becomes less effective for controlling a variation of cooling rate." (emphasis added) By teaching that the molten alloy should enter the grooves, Fukuno et al directly teaches away from the claimed invention, and therefore, the claimed invention is not obvious. As such, reconsideration and withdrawal of this rejection is respectfully requested.

DOUBLE-PATENTING

Claims 1 to 17 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 to 16 of copending Application No. 09/870,241.

Applicant elects to defer the filing of a terminal disclaimer until the Examiner has considered the claims, as amended.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: Dec 6, 2002

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ATTACHMENT FOR CLAIM AMENDMENTS

The following is a marked up version of each amended claim in which underlines indicates insertions and strike-throughs indicate deletions.

1. (Amended) A cooling roll for manufacturing a ribbon-shaped magnetic material by colliding a molten alloy to a circumferential surface of the cooling roll so as to cool and then solidify ~~it~~ the molten alloy, ~~wherein~~ the cooling roll comprising:

~~has~~ gas expelling means defined by at least one groove provided in the circumferential surface of the cooling roll for expelling gas entered between the circumferential surface and a puddle of the molten alloy;

wherein the average width of the groove is 0.5 – 90 μm for preventing the molten alloy from entering the groove.

3. (Amended) The cooling roll as claimed in claim 1, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity lower than the heat conductivity of the structural material of the roll base at ~~or around a~~ room temperature.

5. (Amended) The cooling roll as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity equal to or less than 80 W $m^{-1}K^{-1}$ at ~~or around a~~ room temperature.

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6. (Amended) The cooling roll as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a coefficient of thermal expansion in the range of 3.5 – 18 [$x10^{-6}K^{-1}$] at ~~or around a~~ room temperature.

12. (Amended) The cooling roll as claimed in claim 1 ~~10~~, wherein the average depth of the groove is 0.5 – 20 μm.

13. (Amended) The cooling roll as claimed in claim 1 ~~10~~, wherein the angle defined by the longitudinal direction of the groove and the rotational direction of the cooling roll is equal to or less than 30 degrees.

14. (Amended) The cooling roll as claimed in claim 1 ~~10~~, wherein the groove is formed spirally with respect to the rotation axis of the cooling roll.

15. (Amended) The cooling roll as claimed in claim 1 ~~10~~, wherein the at least one groove includes a plurality of grooves which are arranged in parallel with each other through an average pitch of 0.5 – 100 μm.

16. (Amended) The cooling roll as claimed in claim 1 ~~10~~, wherein the groove has openings located at the peripheral edges of the circumferential surface.

17. (Amended) The cooling roll as claimed in claim 1 ~~10~~, wherein the ratio of the projected areas of the groove with respect to the projected area of the circumferential surface is 10 – 99.5%.